BLAST ATTENUATING, BLAST-DIRECTING AND EXTINGUISHING APPARATUS

The present invention relates to a blast direction, blast attenuation and extinguishing apparatus.

Containers such as litterbins have been used by terrorists to plant bombs in public places. As most the containers used for public use are metal, explosives placed in such containers, are dangerous because of the shrapnel generated from the break up of the container body into fragments, which are rapidly dispersed in random directions. Indeed, some areas have dispensed with such litter bins and other storage areas because of their potential risk.

STATEMENT OF INVENTION

The invention is defined in the attached claims. All subsequent passages of the description relate to preferred combinations of optional features or exemplary embodiments of the invention within the scope of the claims. A blast directing, blast-attenuating and extinguishing apparatus and method comprises a primary spherically interior shaped container with a secondary inner container. A cavity defined between the two containers is a containment means for fluid with good compression qualities to reduce the initial force of the blast. The wall of the primary container is of uniform thickness other than in certain membrane regions at the aperture part of the primary container, where the wall is much thinner. An explosion or blast arising in the inner container results in a compression force on the fluid inside the cavity. The easiest escape route of the fluid from the cavity is then through the thinner-walled membrane regions. Fluid and any debris generated from the possible rupture of the inner container are then directed out through the aperture, in a less harmful manner than the radially directed debris from an explosion occurring in an ordinary enclosure.

In a further assembly, in place of the membrane regions are apertures through which fluid and debris can be displaced. The aperture part of the unit may be detachable for the re-use of the primary unit.

A blast attenuating, blast-directing and extinguishing apparatus comprises a housing containing fluid having an inner wall and an outer wall structure having one or a plurality

of apertures such that force from a blast applied to the inner wall causes an increase pressure in said housing, the rise in fluid pressure causing displacement of fluid and air through said apertures. Energy from the blast is thus transformed to energy expended in displacement of the fluid from the housing.

Advantageously, said apertures are covered with membrane regions disposed in the outer wall structure, which membrane regions are weaker in structure in comparison with the rest of the outer wall structure, such that any rise in fluid pressure in the housing cause preferential rupture of the membrane regions and consequent exposure of said apertures.

The housing may be made of plastic, fibreglass, lightweight metal or any adaptable material. The dimensions of the aperture can be altered to direct the blast exhaust including debris from the apparatus in a desired direction.

Advantageously, said membrane regions are disposed in the aperture portion of said outer wall structure and oriented such that fluid/material displacement through said apertures is initially safely re-directed away from harms way.

Preferably, said inner wall forms all or part of a primary container adapted to removeably receive a further container such as a litterbin.

Advantageously, said outer wall structure forms all or part of a primary container, which may be a hollow sphere of varying wall thickness', said membrane regions being of lesser thickness than the remainder of said outer wall structure.

Furthermore, said inner container is adapted to deform and/or rupture easily in the event of a blast or explosion therein, to thereby transfer lateral forces of the blast to the liquid in the housing.

It is advantageous that said membrane regions are inclined towards a central axis of the assembly and are disposed in diametrically opposite pairs so that any membrane rupture produces apertures in the housing from which jets of fluid/material and debris of the inner container or said further container housed therein, can emerge and the resultant opposing jets coincide on said central axis. Energy from a blast in the assembly is thus dispersed through collision of coincident jets of fluid and/or debris, as well as through displacement of fluid from the housing.

In a further embodiment of the present invention, said apertures are continuous with tubing means into which water can be displaced. In another embodiment said tubing means runs between diametrically opposite membrane regions such that jets

of fluid and debris simultaneously arising from opposing regions will disperse energy from the blast, through collision with one another in the tube. The tube is further provided with one or a plurality of perforations through which fluid can pass to extinguish any flames below the tube. A canopy can be provided over said tubing to attenuate any upwardly directed fluid and/or debris from the assembly. The tubing may be u-shaped in cross-section.

In another embodiment of the present invention, the tubing can run substantially vertically upwards to an area outside a building in which the assembly is placed.

Preferably, one or a plurality of sealable means is provided in the housing into which fluid can be placed and from which fluid can be emptied.

Advantageously, the housing is only partially filled with fluid. Where the housing is provided with membrane regions, the air/gas above the fluid is compressible behind the membrane regions when the fluid below is displaced towards the aperture portion of the housing.

A base portion is provided for the housing to add stability and reduce the likelihood of rolling if the assembly is tipped over. A device for loading and emptying fluid from said container can also be provided.

Said tubes may be adapted for ornamentation by plants, said spheres may be used for advertising, and an optional seating area placed around the outer face of said housing.

In accordance with a method for attenuating or re-directing a blast, the energy and/or debris from an explosion is dispersed through displacement of fluid or material in a specified direction. The inner spherical nature of the device is the fundamental item, which reduces and directs the force of the blast and the debris in a desired direction.

A preferred embodiment of the present invention will now be described with respect to the accompanying drawings in which:

FIG. 1 is an embodiment of a spherical blast-attenuating blast-directing assembly with apertures of the present invention.

FIG. 2 is a further embodiment of a blast assembly.

FIG. 3 is still further embodiment of a blast assembly with containment hood.

FIG. 4 is a plan view of the embodiment showing aperture and membrane in fig. 1,

FIG. 5 is a plan view of the embodiments shown in figs. 2 and 3

The assembly 1 comprises of an inner container 2 disposed symmetrically inside a primary container 3. The primary container 3 comprises an aperture member 4 and a hollow sphere 5. The outer walls 6 of the inner container 2, the inner walls of the primary container 3, together with the upper member 4, define a housing in which fluid 7 such as water can be disposed. An upper edge 8 of the inner container 1 is disposed lower than an upper edge 9 of the inner container 2. Upper member 4 spans the annular gap between edges 8 and 9, respectively.

Upper member 4 is provided with diametrically opposed membrane regions, circular or elongated in shape (Figs. 4 & 5), which are of a lesser thickness in comparison with the rest of the upper member 4. These membrane regions prevent objects from being inserted into the apertures 16 of assembly. The membrane regions also enable compression of air between the upper member and the surface of fluid contained, in the event of explosion, which compression can aid uniform emergence of fluid from the apertues. The upper member 4 may be moulded as an integral part of the primary container or it may be a member separate from the primary in inner containers for replacement.

The inner container is adapted to receive a further container such as a litterbin (not shown). The inner container 2 is made of a material, which will readily deform and/or collapse in the event of an explosion inside the litterbin. Lateral forces generated by collapse of the wall of the inner container generate a pressure wave that causes uniform radial compression on the fluid in the housing, compression of the gas above it and eventual fluid breakthrough through the membrane regions, the weaker parts of the primary container. Once perforated, the membrane regions define apertures 16 through which jets of water and diverted debris emerge. Because of the symmetrical arrangement of the membrane regions and their inclination towards the central axis of symmetry 11 of the assembly, simultaneously emergent jets of water will coincide over the central axis, and

thereby disperse at this location, some of the energy of fluid flow due to the blast. Further sealable apertures 18 (only one shown) are provided in the assembly as inlet and outlet means for said fluid.

A base member 12 is adapted to be attachable to any part of the primary container. The base has three or more sides, and has an overall width approximately equal to that of the sphere diameter. Should the assembly be tipped on its side, the base will prevent it from rolling.

In another embodiment shown in fig. 2, tubes 13 can be disposed continuous with apertures 16, which tubes can lead upwards and/or outwards of a building or other container. Such an embodiment can dispense with the membrane regions of the embodiment in fig. 1.

In a still further embodiment shown in fig. 3, U-shaped tubing 14 can run between diametrically opposite apertures 16. The tubing can be provide with apertures 15 through which fluid from the housing can be displaced, and thereby act as extinguishing means in the event of the presence of a fire. A hemispherical canopy 17 disposed over the u-shaped tubing will attenuate any upwardly directed fluid and/or debris from the blast in the assembly.

In addition, the device can act as a fire-extinguishing unit. If a fire is generated in the assembly through combustion of material in the primary container, the internal walls can collapse under the effect of heat to release the water over the fire.